guess what....?

"This is a jar of jelly beans. Can you guess how many jelly beans are in the jar? The person who gets the closest is the winner and can have the jelly beans."

new VOICES

Ben Colmer looks at the difference between a "guess" and an "estimate" and provides compelling reasons to develop children's estimation skills for use in everyday life.

The "jelly bean jar" guessing competition! A reliable way to fundraise $10.20 at the annual school fete, but is it a sufficient method of teaching our students the valuable skill of estimation?

Teachers often encounter difficulty in teaching estimation of measurement to young children. The intention when teaching the typical "jelly bean jar" classroom activity is to help children develop estimation skills, but most children cannot conceptualise the difference between guessing and estimating (Lang, 2001). The fact is that many students view estimation as a difficult technique where their success is measured by how close their own estimation is to the teacher's estimation; a misconception that is far removed from the useful and practical experience estimating should be (Muir, 2005).

The NSW Board of Studies (2002) emphasises the importance of children's participation in estimation activities through extensive practice. As teachers we need to provide students with opportunities to improve their number, spatial and measurement sense through experiential estimation. Hence, the intention of this article is to illustrate that estimation is a skill that is practical and relevant to student's lives, and to provide teachers with some purposeful strategies to help develop their students' skills in estimation.

At what point does guessing become estimating?

To arrive at a definition for a guess it would be reasonable to assume that it is forming an opinion about something without evidence to support the opinion fully (Macquarie University, 2004). So when a student is asked how they came up with an answer, the "just because", "I just thought it" and "I don't know" reasoning is usually indicative of a guess. But estimation is more than just a guess; in fact guessing is only the very first step toward making an estimate. What we know about estimation is that it:

- "is an informed judgement that requires practice" (Thom, 2002)
- "connects past experiences to the present situation and is knowing which patterns to apply in which experience" (Centre for Innovation in Education, 2003)
- "is a thinking skill involving the process of thinking about a 'how many' or 'how much' problem and possible solutions" (Lang, 2001)
- "is used to validate measuring tools and methods" (Muir, 2005).

What we can derive from these facts is that an estimation is an informed, practiced and rationalised judgement about "how much", "how long" or "how many" that we make based on our prior experience with tangible concepts.

So why is estimating so important in the measurement strand of the K–6 Mathematics syllabus?

According to the K–6 Mathematics Syllabus (BOSNSW, 2002), all measurements are approximations. So assuming Thom (2002) is correct in claiming that estimation is a process of measurement where the aim is approximation, estimating should be implicit in all forms of teaching measurement.

Bobis, Mulligan and Lowrie (as cited in Lindsay & Scott, 2005) have suggested that unlike numerical estimation, knowledge of facts and learned rules are not necessarily advantageous in the estimation of measurement. It is, however, the practical application of estimation in measurement that facilitates a direct link to formal measurement and ultimately forms the foundation of many important mathematical concepts (Lindsay & Scott, 2005). Lang (2001) has researched this notion further and illustrated that because of the inherencies of measurement estimates, children will improve their understandings and verbalisations of the language of comparison through estimation. When children make comparisons between measurements in the process of estimating, they connect number order with number magnitude and are forced to use the terminology of bigger or smaller, longer or shorter, heavier or lighter, etc. (Lang, 2001).

Thom (2002) has also indicated that measurement can be learned more successfully if estimation activities are frequently used. If students invest in a problem through their initial estimations, they establish a commitment to the problem and finding the answer then becomes meaningful.

How do we teach estimation in measurement?

1. An estimate is NEVER wrong!

Your own classroom experience will tell you that children do not want to be wrong. If we intend to teach our students effective and meaningful estimation strategies, we need to adopt a mentality that rewards estimations that are improved upon repetition; a more exact estimate is no more "correct" than another reasonable estimate (Muir, 2005). A particularly useful strategy outlined by Muir (2005) is to have students consider and agree on the higher and lower limit they are certain the measure will lie within. Whether measuring the amount of milk needed for a bowl of cereal, how many cups of dog food equates to 500 grams or the area of the local park, students should be encouraged to estimate within increasingly restricted limits.

It is important for us to not always record or keep track of whose estimate is the closest or make estimating a contest. It is equally as important to try and avoid the kinds of estimation activities where we ask students to make an estimate and then follow this by asking students to measure exactly then ask how close they were. Every student gains experience from every estimation that is made (Centre for Innovation in Education, 2003).

2. Estimation should be useful and practical!

Estimation is not a skill isolated to solving problems of how many cups of water an arbitrary container from the school storeroom can hold. Nor is it just the ability to guess the length of a basketball court that your students may never play on. So why should estimation be taught in this way?

A good way to introduce the concept of estimation is to ask students to think of times when they or someone they know has made an estimate instead of an exact measurement. Muir (2005) demonstrated that students are able to recognise situations that include their mother making estimates during cooking, umpires and referees estimating length in sporting events (e.g., 10m offside rules) and assistants at the delicatessen estimating mass when asked for 300 grams or $4.00 worth of ham. This will begin to make students aware of how frequently estimates are used in everyday life and will demonstrate how important the skill of estimation becomes, when there are no measuring devices at our disposal.

3. Estimation should be ongoing, fun and relevant

One of the most important and sometimes hardest objectives for a teacher to achieve is the reinforcement of estimation being an ongoing, daily experience. Thom (2002) demonstrates how teachers can achieve this by incorporating estimation into quick informal tasks or discussions such as asking children to estimate how long it will take them to set up for the next classroom lesson. The estimation does not necessarily have to be in terms of standard units of time, but can be measured against how many claps the students can complete or how many times students can do the "chicken dance".

To consolidate these informal learning experiences, teachers can include more formalised estimation activities that can still be relevant to students' daily lives. A useful length estimation activity that could be completed before lunch would be to have students estimate which route from the classroom to the school canteen will be the shortest. Have students think of all the possible routes that could be taken, and then have one student in each group measure the distance in kangaroo hops or side steps. Students can still make formal records of how many kangaroo hops were required for each route and make a judgement about which was the shortest, but the learning experience will become immediately relevant when the students go to lunch and physically walk the shortest route to the canteen.

Conclusions

Estimations should be useful, practical and relevant. If they are not, our students will continue to estimate for the sole purpose of being "correct"; a concept that students will more often than not measure against our own estimations. If we include estimation within formal and informal learning experiences throughout the day (not just as part of a specific skill in our measurement lessons) the improvement in our students' estimation skills will be beneficial for their mathematical understandings and more importantly their functioning in the real world.

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Ben Colmer is a third year Bachelor of Education student at the University of Sydney
<bcol6424@mail.usyd.edu.au>